carmanah®

EG-SERIES

USER MANUAL • MANUAL DEL USUARIO • MANUEL DE L'UTILISATEUR

Model • Modelo • Modèle
EG40/EG80/EG145/EG320/
EG340/EG500

we put solar to work™

Warnings and Precautions

The following symbols indicate important safety warnings and precautions throughout this manual. They are defined as follows:

WARNING indicates that serious bodily harm or death may result from failure to adhere to the precautions.

CAUTION indicates that damage to equipment may result if the instructions are not followed.

NOTE suggests optimal conditions under which the equipment will operate effectively and safely, or provides additional information to the reader.

Warranty Disclaimer

This manual will familiarize you with the features and operation standards of Carmanah's EG-series lights. Failure to comply with the use, storage, maintenance, installation or placement instructions detailed in this manual could void the applicable user warranty.

Standards

Perform all installation, wiring and maintenance in conformance with local building and electrical codes. Adherence to the National Electrical Code (NEC) is mandatory. Non-adherence to code may void the warranty.

Safety and Usage Precautions

Batteries are shipped fully-charged. Use extreme caution when handling the batteries as they are capable of generating hazardous short-circuit currents. Remove all jewelry (bracelets, metal-strap watches, etc.) before attempting to handle the batteries.

Solar modules produce DC electricity when exposed to light and can, therefore, produce an electrical shock or burn. To render solar modules inoperative, remove them from sunlight, or fully cover their front surface with an opaque material.

Before lifting any heavy or bulky equipment, ensure that the load is secured so that moving parts do not shift and it can be lifted as far as needed without back strain or loss of grip. Installation may require more than one person.

Until the system is ready for startup, keep the battery fuse out of the fuse holder. Ensure the equipment is not powered during installation and wiring of the system.

Re-check all completed wiring for proper polarity prior to energizing the system.

On Start-Up, follow the procedures described in the “Testing the system” section of this document.

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NOTE

Changes or modifications to Carmanah equipment not expressly approved by Carmanah could void the user's authority to operate the equipment.

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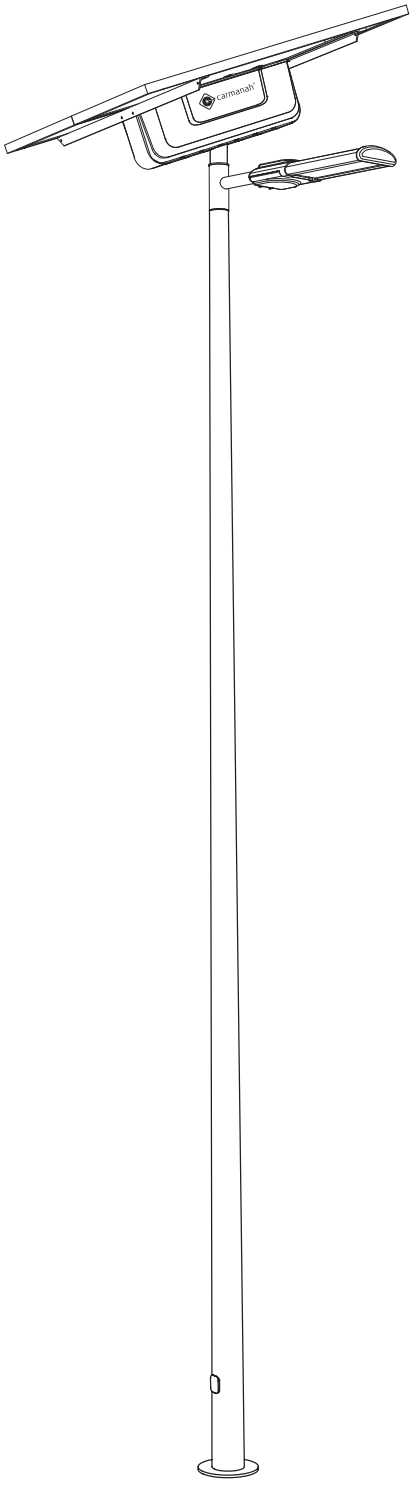

Introduction

EG-series solar LED lighting products are ideal for street, parking lot and general site lighting.

Features and Functionality

The EG-series product family includes the EG40, EG80, EG145 and larger EG320, EG340 and EG500 models. The following components make up these products:

- EG-Series Solar Engine, consisting of:
    - •Energy Mangement System (EMS)
    - •Chassis assembly
    - •Solar panel(s)
    - •Solar panel rails (2)
    - •Batteries
- LED fixture(s)
- EG-series programmer

The solar panels and EMS work together to charge the batteries during the day. At night, the EMS controls the flow of power from the batteries to the LED fixture(s).

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Installation

For details on the assembly and installation of EG-series products, please see the appropriate Installation Guide.

A summary of the assembly and installation process is given below:

- EG-series solar engine is assembled and installed onto the pole using a crane and bucket truck
- The fixture wires are routed and the fixture installed
- The unit is programmed and tested

Accessory installation kits are available and recommended to facilitate system installation. The kits consists of lifting straps, shackles, and a solar panel connector disassembly tool. The part numbers are:

- EG320 Install kit - Carmanah part # 65937
- EG340 Install kit - Carmanah part # 65938
- EG500 Install kit - Carmanah part # 65938

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EG-Series Programmer

The programmer is used to program the EMS with the correct operating profile for your application. The programmer is also used to test the EG-series system to confirm correct operation. The programmer is powered by two AA batteries (not included), and communicates with the EG-series EMS using two-way infrared signals.

The programmer has two buttons: Send and Test. The Send button is used to upload the operating profile (parameters) to the EG-series EMS, while the Test button is used to test that the EG-series system is operating correctly.

The 12 knobs and switches on the programmer come pre-configured with the correct settings for your application. If the knobs or switches get moved accidentally, return them to the positions indicated by the faceplate label.

NOTE

The EG-series uses two-way communication between the programmer and EMS. Therefore each EG-series EMS must be programmed one at a time. Problems arise when more than one EMS is in range during programming.

The programmer has indicator lights and a beeper to convey status to the user. The following table summarizes the meanings of the lights and the beeper:

Feedback	Status
Three short beeps & green OK light ~5s after pressing/holding Send button	Programming successful
One long beep & red Error light ~5s after pressing/holding Send button	Programming not successful
One short beep after pressing/holding Test button	Test command transmitted
One long beep & red Error light immediately after pressing Test or Send button	Replace 2 X AA batteries in programmer

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Setting brightness and Programming

As part of the installation process, the EG-series is configured with a fixture current, which sets the base fixture brightness, and an operating profile, which controls fixture on/off times and, for some profiles, fixture dimming.

The current setting for every EG-series system is carefully chosen to work together with the operating profile without consuming more than the available solar energy in the installation location.

The EG-series is configured in two steps: 1) installing the fixture current-setting resistor, and 2) programming the EMS using the EG-series Programmer.

Installing the current-setting resistor

The amount of current going to the LED fixture(s) is determined by the current setting resistor, which is installed in a sealed holder in the EG-series EMS wiring harness. When no resistor is installed, the fixture current reverts to the lowest possible setting.

The current-setting resistor should be inserted into the holder during the installation of the EG-series system (see EG-series Installation Guide for details). If this step was forgotten during installation, the current-setting resistor can be installed by:

EG320/340/500: pulling the resistor holder out through the access hole under the EMS, removing the holder cap, and inserting the resistor.

EG40/80/145: tilting the solar panel forward, removing the holding cap, and inserting the resistor.

The current-setting resistor can be inserted into the holder in any orientation. Make sure it is seated firmly in the electrical contacts.

Programming using the EG-Series Programmer

The EG-series Programmer is used to upload (program) the operating profile into the EG-series EMS. This should be done during installation of the system (see EG-series Installation Guide for details).

Follow these steps to program the EMS:

- Make sure the knobs and switches are positioned as indicated by the label on the EG-series programmer.
- Point the programmer at the infrared transmitter/receiver on the EG-series EMS.
- Press **and hold** the Send button on the programmer.
- **Continue** to hold down the Send button until the programmer beeps.
- If the Programmer beeps three times and the green OK light on the programmer lights, programming was successful.
- If the Programmer emits one long beep and the red Error light on the programmer lights, programming was not successful.

If programming was not successful, try getting closer to the EG-series EMS and make sure you accurately aim the programmer at the infrared transmitter/receiver on the EMS while pressing and holding the Send button. Programming can be done from the ground, but may not work during the middle of the day, when the strong infrared radiation from the sun interferes with communications between the Programmer and EMS.

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Testing the system

The EG-series Programmer can be used to test the EG-series system. To test the system:

- Point the programmer at the IR transmitter/receiver on the EG-series EMS.
- Press and hold the Test button on the programmer until it beeps once.
- The LED fixture should turn on briefly to indicate that the system is operating properly.

The test command may not be received by the EG-series EMS on bright, sunny days. Try getting closer to the EMS, or try testing later in the day when the sunlight won't interfere as much with communications. See the Troubleshooting section if the fixture still will not turn on.

EMS Indicator Lights

The EG-series EMS has three indicator lights which are visible from the ground at night. On bright days, the lights may be difficult to see from the ground, and a pair of binoculars can be used to see the lights (do not look at the sun directly when operating binoculars).

The following table summarizes the behaviour of the three EMS indicator lights:

Light symbol	Status	Function
	On (green)	Not charging (night detected)
	Flashing (green)	Charging (day detected)
	Off	No battery connected
	On (red)	Load low/high voltage disconnect (Load LVD/HVD)
	Flashing (red)	Load over-current
	Off	Load OK
	On (red)	Dimming due to battery low/high voltage disconnect (Battery LVD/HVD)
	Off	Time-controlled dimming
All 3 lights	Pulsing (all lights)	Programming

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Maintenance & Product Care

The EG-series solar engines are designed to operate reliably for years with virtually no need for maintenance. Carmanah recommends routine inspections of the solar panels to ensure that they are unobstructed by anything that may prevent effective solar charging, including:

- dirt and dust
- snow
- leaves
- debris
- bird droppings
- shade that may have developed after installation due to adjacent plant growth.

The frequency of the inspections depends on location and local weather patterns. A yearly visual inspection of the EG-series solar engine is typically sufficient. The EG-series is designed to be maintenance free, however maximum system performance will be achieved when the LED fixture lenses and solar panels are clean.

Fuse Replacement

A wiring fault during installation or maintenance can sometimes cause the battery fuse to blow. The EG-series is shipped with one extra battery fuses in a small bag tie-wrapped to the battery fuseholder.

To replace the fuse:

1. Make sure you're not wearing any metal jewelry, or holding any tools or other conductive objects.

2. Check all wiring for any faults that may have caused the fuse to blow.

3. EG320/340/500: Carefully reach into the enclosure to the right of the EMS, above the Carmanah symbol, and pull out the yellow rubber fuseholder.

4. Pull the fuseholder apart and check the fuse.

5. Replace a blown fuse with the spare fuse supplied.

If additional fuses are required, use the following replacement fuses or equivalent:

EG40/80/145/320 - Littelfuse part # 0314015.

EG340/500 - Littelfuse part # 0314030.

Battery Replacement

When the EG320/340/500 system's batteries require replacement, it is recommended that the EG-series Maintenance Kit be used (Carmanah part # 63841). This kit provides maintenance brackets which allow the solar panels to be tilted out of the way to allow easy access to the batteries.\

Battery repalcement procedure should not be carried out in windy conditions. In all cases, the area at the base of the pole must be roped off to prevent people from being injured or killed by falling pieces.

Energy Management System (EMS) Recycling

Production of the EMS required the extraction and use of natural resources. The EMS may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. In order to avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle the EMS in an appropriate way that will ensure most of the materials are reused or recycled appropriately. Check your local municipality for electronics recyclers.

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Troubleshooting

Symptom	Circumstances	Possible Cause (solution)
Fixture won't turn on…	…after test button pressed	Sunlight interfering with communications (try again later in the day)
		Too far away (get closer)
		Programmer battery dead (replace batteries)
		Programmer not aimed at EMS receiver (aim carefully)
		Blown battery fuse (check wiring, replace battery fuse)
		Fixture wiring problem (check fixture wiring for short/ open circuit)
Fixture won't turn on…	…at night time	EMS programmed incorrectly (check programmer knob/ switch settings, reprogram EMS)
		Blown battery fuse (check wiring, replace battery fuse)
		Solar panel shaded, causing drained batteries & low-voltage disconnect (prune trees, move pole)
		Solar panel wiring problem caused drained batteries & low-voltage disconnect (check SOLAR PANEL wiring)
		Fixture wiring problem (check fixture wiring for short/ open circuit)
Fixture turns off…	… in the middle of the night	EMS programmed to run for specific time after dusk. This may be correct operation. Please check with your Carmanah distributer.
		Solar panel shaded, causing drained batteries & low-voltage disconnect (prune trees, move pole)
Fixture turns on…	… during the day	EMS not programmed, or programmed incorrectly (check programmer knob/switch settings, reprogram EMS)
		Solar panel wiring open circuit causing system to think it is night. Check Solar panel wires & connectors.
Fixture dim…	… during the night	EMS programmed to run for specific time after dusk. This may be correct operation. Please check with your Carmanah distributer
		Solar panel shaded, causing drained batteries & low voltage disconnect (prune trees, move pole)
Green light on (night mode)...	… during the day	Solar panel wires not connected properly (check Solar panel wires & connectors)
Green light flashing (night mode)...	… during the night	Short between battery & Solar panel wiring (check all wiring)

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Symptom	Circumstances	Possible Cause (solution)
Green light off...	… at all times	Blown battery fuse (check fixture & battery wiring, replace battery fuse)
		Battery wiring problem (check battery wiring)
		Dead batteries due to incorrect EMS programming, solar panel shading, or battery wear-out (check programmer knob/switch settings, reprogram EMS)
Red light on…	… during the night	EMS senses that fixture voltage too high or low (check fixture wiring)
Red light flashing…	… during the night	EMS senses that fixture current is too high (check fixture wiring)
DIM Red light on…	… during the night	Battery low-voltage condition due to incorrect EMS programming, solar panel shading, or battery wear-out (check programmer knob/switch settings, reprogram EMS)
All 3 lights (1 green, 2 reds) pulsing…	…during programming	This is normal behaviour.
Can't program with programmer…	…during the day	Sunlight interfering with communications (get closer to EMS, aim carefully at EMS, try again later in the day)
Can't program with programmer…	…at night	Programmer batteries dead (replace AA batteries)
		Programmer not aimed at EMS IR transmitter/receiver (aim carefully)
		Blown EG-series battery fuse (check wiring, replace battery fuse)

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Specifications

SOLAR ENGINE	EG40	EG80	EG145
EPA*	0.23 m² (2.6 ft²)	0.34 m² (3.7 ft²)	0.58 m² (6.3 ft²)
APA	0.18 m² (2.0 ft²)	0.26 m² (2.8 ft²)	0.45 m² (4.8 ft²)
Weight (without batteries)	16.7 kg (36.7 lb)	18.6 kg (41.0 lb)	26.3 kg (58 lb)
Weight (with batteries)	34.8 kg (76.7 lb)	47.7 kg (105.0 lb)	57.7 kg (127 lb)
Length	66.5 cm (25.8 in)	121 cm (47.6 in)	148.2 cm (58.3 in)
Width	54.0 cm (21.3 in)	54.0 cm (21.3 in)	67.4 cm (26.5 in)
Watts	>40	>80	>145
BATTERIES			
Type	1 x U1 absorbent glass mat (AGM)	1 x group 27 absorbent glass mat (AGM)	1 x group 31 absorbent glass mat (AGM)
Rating	5-7 years at 20% depth of discharge at 20°C (68°F)		
FIXTURE			
LED	High-efficiency light fixture		
MOUNTING			
Solar Engine	Top of pole, round tenon 8.9 cm (3.5 in) outer diameter, min. 7.6 cm (3 in) tall		
Fixture	Mounts to horizontal tenon, 4.25 cm (1.675 in) long, 6 cm (2.375 in) outer diameter		
Wind Load Rating	241 kph (150 mph)**		
ENERGY MANAGEMENT SYSTEM (EMS)			
Optional Operating Profiles	Dusk-to-Dawn Fixed Night, 6hr Fixed Night, 8hr Split Night 5hr, 25%, 2hr Split Night 5hr, 25%, 4hr Split Night 7hr, 25%, 2hr Split Night 7hr, 25%, 4hr		
Day/night transitioning	Via solar panels		
Status Indicators	Battery connection, low/high voltage disconnect, dimming		
PHOTOMETRICS* **			
Fixture Efficacy	Minimum 85 lm/W		
IES Light Distributions	Type II, Type III, Type IV, Type V (backlight control available)		
Other	International Dark-Sky Association (IDA) approved, measured for performance using IESNA standards including IES BUG rating system		
Photometry	Certified photometry per IESNA LM-79-2008 & LM-80-2008		
Typical Applications	Pathways, small site lighting	Small roadways and pathways, small site lighting	Urban roadways, small site lighting, small parking lots
CERTIFICATIONS			
CE 2004-108-CE, EN 55015, EN 61547 for emissions and immunity IP 68 Energy Management System (EMS)			
ACCESSORIES			
Remote control, spares.			

* Effective Projected Area (EPA) calculated as the Actual Projected Area (APA) muliplied by a drag coefficient of 1.3. EPA of engine only: does not include fixture EPA.
** 3 second gust as per AASHTO 2001
*** Photometric performance depends on the solar environment of location and specified operating profile. Contact a Carmanah representative for exact lumen output and specifications for your application.

Note: specifications subject to change without notice

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Specifications

SOLAR ENGINE	EG320	EG340	EG500
EPA*	0.69 m² (7.45 ft²)	1.32 m² (14.17 ft²)	1.89 m² (20.3 ft²)
APA	0.53 m² (5.73 ft²)	1.01 m² (10.90 ft²)	1.45 m² (15.6 ft²)
Weight (without batteries)	39 kg (85 lb)	59 kg (130 lb)	87.6 kg (193 lb)
Weight (with batteries)	95 kg (210 lb)	175 kg (385 lb)	212.9 kg (469 lb)
Length	157.5 cm (62 in)	157.5 cm (62 in)	196 cm (77 in)
Width	82.6 cm (32.5 in)	165.2 cm (65 in)	196 cm (77 in)
Watts	>170	>340	>500
BATTERIES			
Type	2 x group 27 absorbed glass mat (AGM)	4 x group 27 absorbed glass mat (AGM)	4 x group 31 absorbed glass mat (AGM)
Rating	5-7 years at 20% depth of discharge at 20°C (68°F)		
FIXTURE			
LED	Up to 2 x high-efficiency light fixtures		
MOUNTING			
Solar Engine	Top of pole, round tenon 8.9 cm (3.5 in) outer diameter, min. 15.2 cm (6 in) tall		
Fixture	Mounts to horizontal tenon, 4.25 cm (1.675 in) long, 6 cm (2.375 in) outer diameter		
Wind Load Rating	209 kph (130 mph)**		
ENERGY MANAGEMENT SYSTEM (EMS)			
Optional Operating Profiles	Dusk-to-Dawn Fixed Night, 6hr Fixed Night, 8hr Split Night 5hr, 25%, 2hr Split Night 5hr, 25%, 4hr Split Night 7hr, 25%, 2hr Split Night 7hr, 25%, 4hr		
Day/night transitioning	Via solar panels		
Status Indicators	Battery connection, low/high voltage disconnect, dimming		
PHOTOMETRICS* **			
Fixture Efficacy	Minimum 85 lm/W		
IES Light Distributions	Type II, Type III, Type IV, Type V (backlight control available)		
Other	International Dark-Sky Association (IDA) approved, measured for performance using IESNA standards including IES BUG rating system		
Photometry	Certified photometry per IESNA LM-79-2008 & LM-80-2008		
Typical Applications	Urban roadways, small perimeter lighting, parking lots	Large roadways, perimeter lighting, large parking lots	Highways, large site, perimeter and large parking lot lighting
CERTIFICATIONS			
CE 2004-108-CE, EN 55015, EN 61547 for emissions and immunity IP 68 Energy Management System (EMS)			
ACCESSORIES			
Remote controll			

* Effective Projected Area (EPA) calculated as the Actual Projected Area (APA) muliplied by a drag coefficient of 1.3. EPA of engine only: does not include fixture EPA.
** 3 second gust as per AASHTO 2001
*** Photometric performance depends on the solar environment of location and specified operating profile. Contact a Carmanah representative for exact lumen output and specifications for your application.

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Warranty

This product is covered by the Carmanah warranty. Visit www.carmanah.com for additional information.

If contacting Carmanah's customer service department, please have the serial number of your system available (located on EMS) or sales order number, a brief description of the problem, as well as all details of the installation.

To contact Carmanah's Customer Service Department:

Mail: Carmanah Technologies Corporation
250 Bay Street
Victoria, BC Canada V9A 3K5

Phone: 1.250.380.0052
877.722.8877 (Toll Free in U.S. and Canada)

Fax: 1.250.380.0062

Email: customerservice@carmanah.com

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